

IN THE CLAIMS:

1. (Currently Amended) A scribing device for a brittle material substrate, which continuously heats a region along a line to be scribed on a surface of the brittle material substrate at a temperature lower than a softening point of the brittle material substrate and, also, continuously cools a region in the vicinity of the heated region, thereby forming a blind crack along said line to be scribed, the device comprising:

a light source;

a polarizing beam splitter splitting light from the light source based on a polarization state, said polarizing beam splitter transmitting the split light in a specific polarization direction;

an optical fiber arranged such that light transmitted through said polarizing beam splitter enters the region of the blind crack formation in the vicinity of the cooled region on the surface of said brittle material substrate and the light reflected by the blind crack is returned to said polarizing beam splitter;

a light reception element receiving reflected light from said blind crack via said polarizing beam splitter; and

a determination unit including a window comparator, said determination unit with said window comparator determining whether a level of light receiving signal obtained from said light reception element is between predetermined thresholds V_{ref1} and V_{ref2} , V_{ref1} being greater than V_{ref2} , wherein a shape state of the blind crack is determined based on an output from said ~~determination unit~~ window comparator, said determination unit with said window

comparator determining a defective blind crack when said level of light receiving signal is greater than V_{ref1} or lower than V_{ref2} , said determination unit with said window comparator determining a normal blind crack when said level of light receiving signal is between V_{ref1} and V_{ref2} .

2 - 8. (Canceled)

9. (Currently Amended) A scribing method for a brittle material substrate, in which a region along a line to be scribed on a surface of a brittle material substrate is continuously heated at a temperature lower than a softening point of the brittle material substrate and, also, a region in the vicinity of the heated region is continuously cooled, such that a blind crack is formed along said line to be scribed, the method comprising:

providing a determination unit comprising a comparator means;

splitting light from a light source with a polarizing beam splitter based on a polarization state;

allowing light in a specific polarization direction, having transmitted through said polarizing beam splitter, to enter the region of the blind crack formation in the vicinity of the cooled region on the surface of said brittle material substrate via an optical fiber;

returning the light reflected by the blind crack to said polarizing beam splitter via said optical fiber;

receiving the light split by said polarizing beam splitter from the reflected light from

15 the blind crack with a light reception element; [[and]]

determining whether a level of light receiving signal obtained from said light reception element is between a predetermined upper light receiving signal threshold and a predetermined lower light receiving signal threshold with said comparator means to provide a comparator means output, whereby the brittle material substrate is scribed while determining a condition
20 ~~of the blind crack formation of the brittle material substrate~~, said predetermined upper light receiving signal threshold being greater than said predetermined lower light receiving signal threshold;

determining a condition of the blind crack formation based on said comparator means output with said determination unit when the brittle material substrate is scribed;

25 continuing to scribe ~~scribing~~ the brittle material when said level of light receiving signal is less than or equal to said predetermined upper light receiving signal threshold and greater than or equal to said predetermined lower light receiving signal threshold, wherein the brittle material is not scribed when said level of light receiving signal is greater than said predetermined upper light receiving signal threshold or less than said predetermined lower light
30 receiving signal threshold.

10 - 14. (Canceled)

15. (Currently Amended) An automated breaking line system for a brittle material substrate, the automated breaking line system comprising:

a device for breaking the brittle material substrate; and

5 a scribing device for scribing a brittle material substrate, said scribing device continuously heating a region along a line to be scribed on a surface of the brittle material substrate at a temperature lower than a softening point of the brittle material substrate and continuously cooling a region in the vicinity of the heated region such that a blind crack along said line to be scribed is formed, said scribing device including:

a light source for emitting light;

10 a polarizing beam splitter splitting light from said light source based on a polarization state, said polarizing beam splitter transmitting light in a polarization direction;

an optical fiber receiving light split via said polarizing beam splitter, said optical fiber guiding said light split via said polarizing beam splitter such that light enters the region of the blind crack formation in an area of the cooled region on the surface of the brittle material substrate, said optical fiber receiving the light reflected by the blind crack such that
15 said optical fiber transmits said light to said polarizing beam splitter;

a light reception element receiving reflected light from said blind crack via said polarizing beam splitter; and

a determination unit including a window comparator means for determining to
20 ~~determine~~ whether an amount of light received via said light reception element is within a predetermined upper light receiving threshold V_{ref1} and a predetermined lower light receiving threshold V_{ref2} to provide a comparator means output, said predetermined upper light receiving threshold V_{ref1} being greater than said predetermined lower light receiving threshold

Vref2, ~~wherein~~ said determination unit determining a formation state of the blind crack is
25 ~~determined~~ based on ~~[[an]]~~ said output from said ~~determination unit~~ window comparator
means, said formation state of the blind crack being a defective formation state when said
amount of light received via said light reception element is greater than said predetermined
upper light receiving threshold Vref1 or less than said predetermined lower light receiving
threshold Vref2, said formation state of the blind crack being a normal formation state when
30 said level of light received via said light reception element is greater than or equal to said
predetermined lower light receiving threshold Vref2 and less than or equal to said
predetermined upper light receiving threshold Vref1.

16. (Canceled)

17. (Previously Presented) A scribing device in accordance with claim 1, wherein said
shape state of the blind crack is continuously determined based on said output from said
determination part when the brittle substrate material is scribed.

18. (Previously Presented) A scribing device in accordance with claim 1, wherein the
brittle substrate material is not scribed when said level of light receiving signal obtained from
said light reception element is not within said predetermined thresholds.

19. (Previously Presented) A scribing method in accordance with claim 9, wherein

said condition of the blind crack formation of the brittle material substrate is continuously determined.

20. (Previously Presented) A scribing method in accordance with claim 9, wherein the brittle substrate material is not scribed when said level of light receiving signal obtained from said light reception element is not within predetermined thresholds.

21. (Previously Presented) An automated breaking line system in accordance with claim 15, wherein said shape state of the blind crack is continuously determined based on said output from said determination part when the brittle substrate material is scribed.

22. (Previously Presented) An automated breaking line system in accordance with claim 15, wherein the brittle substrate material is not scribed when said level of light receiving signal obtained from said light reception element is not within predetermined thresholds.

23. (Previously Presented) A scribing device in accordance with claim 1, wherein said determination unit determines whether said level of light receiving signal is within said predetermined thresholds when light is projected on a surface of said substrate, said determination unit not determining whether said level of light receiving signal is within said predetermined thresholds when light is projected at a scribe starting point of said substrate and a scribe ending point of said substrate.